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CM We claim:

1. An implantable prosthesis for occluding the opening of a tissue or muscle defect, comprising:

a pliable implantable material having at least a first portion constructed and arranged to cover the opening of the defect;

an implantable frame constructed and arranged to circumscribe said at least first portion, said frame being stiffer than said at least first portion;

means for attaching said pliable implantable material to said frame so that said at least first portion is disposed within said frame;

said implantable prosthesis having a sufficient hoop strength to limit the deflection of said first portion into the defect opening when said frame is positioned relative to the tissue or muscle defining the defect opening.

Claim 1

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2. The implantable prosthesis recited in claim 1 wherein said pliable implantable material includes a material having a plurality of interstices constructed and arranged to allow tissue ingrowth so that said material becomes secured to neighboring tissue after implantation.

3. The implantable prosthesis recited in claim 1 wherein said implantable prosthesis has a first substantially flat configuration, said first configuration being selectively formable into a three-dimensional second configuration, said implantable prosthesis being automatically revertable from said three-dimensional second configuration to said first substantially flat configuration when relaxed.

4. The implantable prosthesis recited in claim 3 wherein said second three-dimensional configuration includes a substantially cylindrical configuration.

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5. The implantable prosthesis recited in claim 1 wherein said pliable implantable material includes an implantable mesh fabric.

6. The implantable prosthesis recited in claim 1 wherein said pliable implantable material includes a knitted polypropylene monofilament mesh material.

7. The implantable prosthesis recited in claim 1 wherein said implantable frame includes a single member.

8. The implantable prosthesis recited in claim 1 wherein said implantable frame includes a plurality of spaced members.

9. The implantable prosthesis recited in claim 1 wherein said implantable frame includes a portion of said pliable implantable material.

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10. The implantable prosthesis recited in claim 9 wherein said portion of said pliable implantable material includes a cold formed pattern in said pliable implantable material.

11. The implantable prosthesis recited in claim 9 wherein said portion of said pliable implantable material includes a hot formed pattern in said pliable implantable material.

12. An implantable prosthesis for occluding the opening of a tissue or muscle defect, comprising:

a pliable implantable mesh fabric having a plurality of interstices constructed and arranged to allow tissue ingrowth so that said implantable mesh fabric becomes secured to neighboring tissue after implantation, said implantable mesh fabric including a body portion constructed and arranged to cover the defect opening when positioned thereagainst; and

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a ring of implantable material attached to and circumscribing said body portion, said implantable ring being stiffer than said body portion of said implantable mesh fabric.

13. The implantable prosthesis recited in claim 12 wherein said implantable prosthesis has a sufficient hoop strength to limit the deflection of said body portion when said implantable ring is positioned relative to the tissue or muscle defining the defect opening.

14. The implantable prosthesis recited in claim 12 wherein said pliable implantable ring is formed of a silicone containing material.

15. The implantable prosthesis recited in claim 12 wherein said pliable implantable ring is formed of a polypropylene containing material.

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16. The implantable prosthesis recited in claim 12 wherein said pliable implantable ring has a substantially rectangular cross-section.

17. The implantable prosthesis recited in claim 12 wherein said pliable implantable ring includes a circular shape.

18. The implantable prosthesis recited in claim 12 wherein said pliable implantable ring includes an elliptical shape.

19. The implantable prosthesis recited in claim 12 wherein said pliable implantable ring includes a polygonal shape.

20. The implantable prosthesis recited in claim 12 wherein said implantable prosthesis has a flat configuration.

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21. The implantable prosthesis recited in claim 12 wherein said implantable prosthesis has a concave configuration.

22. The implantable prosthesis recited in claim 12 wherein said implantable prosthesis has a convex configuration.

23. An implantable prosthesis for occluding the opening of a muscle or tissue defect, comprising:

an implantable material including a body portion constructed and arranged to cover the defect opening when positioned thereagainst;

an implantable base attached to and circumscribing said body portion;

a plurality of barbs extending at spaced locations from said implantable base, wherein said plurality of spaced barbs prevent migration of said implantable prosthesis after implantation.

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24. The implantable prosthesis recited in claim 23 wherein said implantable material includes a mesh fabric having a plurality of interstices constructed and arranged to allow tissue ingrowth so that the mesh becomes secured to neighboring tissue.

25. The implantable prosthesis recited in claim 23 wherein said plurality of spaced barbs extend perpendicularly from said pliable implantable base.

26. The implantable prosthesis recited in claim 23 wherein said plurality of spaced barbs have a semi-circular cross-sectional shape.

27. The implantable prosthesis recited in claim 23 wherein said plurality of spaced barbs have a triangular cross-sectional shape.

28. The implantable prosthesis recited in claim 23 wherein said plurality of spaced barbs have a pointed distal tip.

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29. The implantable prosthesis recited in claim 23 wherein said plurality of spaced barbs are integrally formed with said implantable base.

30. The implantable prosthesis recited in claim 23 wherein said plurality of spaced barbs are uniformly spaced about said implantable base.

31. An implantable prosthesis for occluding the opening of a muscle or tissue defect, comprising:

a substantially circular sheet of pliable implantable mesh fabric having a plurality of interstices constructed and arranged to allow tissue ingrowth so that the pliable implantable mesh fabric becomes secured to neighboring tissue after implantation, said pliable circular sheet of implantable mesh fabric stimulating an inflammatory response when implanted in tissue; and

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a substantially circular ring of implantable material constructed and arranged to circumscribe the defect opening and attached to said substantially circular sheet of pliable implantable mesh fabric, said substantially circular ring being more rigid than said substantially circular sheet of pliable implantable mesh fabric.

32. The implantable prosthesis recited in claim 31 wherein said implantable prosthesis has a sufficient hoop strength to limit the deflection of said substantially circular sheet of pliable implantable mesh fabric into the defect opening when said ring of implantable material is positioned relative to the tissue or muscle defining the defect opening.

33. The implantable prosthesis recited in claim 31 wherein said pliable implantable mesh fabric which stimulates an inflammatory response when implanted in tissue includes a knitted polypropylene monofilament mesh material.

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34. The implantable prosthesis recited in claim 31 further including a pliable flat sheet of barrier material which does not substantially stimulate the formation of postoperative adhesions, said pliable flat sheet of barrier material and said pliable implantable mesh fabric being supported in a face-to-face relationship.

35. The implantable prosthesis recited in claim 34 wherein said pliable flat sheet of barrier material and said pliable implantable mesh fabric are attached along opposing surfaces.

36. The implantable prosthesis recited in claim 34 wherein said substantially circular implantable ring is disposed between said pliable flat sheet of barrier material and said pliable implantable mesh fabric.

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37. The implantable prosthesis recited in claim 36 wherein said pliable flat sheet of barrier material and said pliable implantable mesh fabric are attached to said substantially circular implantable ring.

38. The implantable prosthesis recited in claim 37 wherein the perimeter of said pliable flat sheet of barrier material is larger than the perimeter of said pliable implantable mesh fabric.

39. An implantable prosthesis for occluding the opening of a muscle or tissue defect, comprising:

a pliable implantable sheet of mesh fabric having a plurality of interstices constructed and arranged to allow tissue ingrowth so that said pliable implantable sheet of mesh fabric becomes secured to neighboring tissue after implantation, said pliable implantable sheet of mesh fabric including a body portion constructed and arranged to cover the defect opening and a plurality of anchoring portions

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extending at spaced locations from said body portion for anchoring said implantable prosthesis to tissue surrounding the defect; and

an implantable hoop carried by said pliable implantable sheet of mesh fabric between said body portion and said plurality of anchoring portions, said implantable hoop being constructed and arranged to circumscribe the defect opening and being stiffer than said body portion.

40. The implantable prosthesis recited in claim 39 wherein said implantable prosthesis has a sufficient hoop strength to limit the deflection of said body portion into the defect opening when said hoop is positioned relative to the tissue or muscle defining the defect opening.

41. The implantable prosthesis recited in claim 39 wherein said plurality of anchoring portions are co-planar with said body portion.

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42. The implantable prosthesis recited in claim 39 wherein said plurality of anchoring portions are liftable relative to said implantable hoop.

43. The implantable prosthesis recited in claim 39 wherein said plurality of anchoring portions are uniformly spaced about said implantable hoop.

44. The implantable prosthesis recited in claim 39 wherein said implantable sheet of mesh fabric includes a substantially square shape and said hoop includes a substantially round shape, said hoop inscribing said implantable sheet of mesh fabric so that the portions of said implantable mesh fabric outside said hoop form said plurality of anchoring portions.

45. An implantable prosthesis for occluding the opening of a muscle or tissue defect, comprising:

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an implantable sheet of mesh fabric having a plurality of interstices constructed and arranged to allow tissue ingrowth, said implantable sheet of mesh fabric including a body portion constructed and arranged to cover the defect opening and a plurality of anchoring portions extending from said body portion, said implantable sheet of mesh fabric stimulating an inflammatory reaction when implanted into tissue;

a pliable sheet of barrier material which does not substantially stimulate the formation of postoperative adhesions;

means for attaching said pliable sheet of barrier material to said implantable mesh fabric so that portions of said pliable sheet of barrier material are pivotable to reveal said anchoring portions of said implantable sheet of mesh fabric but not said body portion.

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46. An implantable prosthesis for occluding the opening of a muscle or tissue defect, comprising:

a sheet of implantable mesh material having a plurality of interstices constructed and arranged to allow tissue ingrowth, said implantable mesh fabric stimulating an inflammatory reaction when implanted into tissue;

a sheet of implantable barrier material which does not substantially stimulate the formation of postoperative adhesions, said implantable mesh material sheet and said implantable barrier material sheet being positioned in face-to-face relationship with the edges of said implantable barrier material sheet overlapping the edges of said implantable mesh material sheet;

an implantable ring attached to at least one of said implantable mesh material sheet and said implantable barrier material sheet, said implantable ring being more rigid than said implantable mesh

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material sheet and said implantable barrier material sheet and constructed and arranged to extend about the defect opening.

47. An implantable prosthesis for occluding the opening of a muscle or tissue defect, comprising:

a pliable implantable sheet of mesh fabric having a plurality of interstices constructed and arranged to allow tissue ingrowth so that the pliable implantable sheet of mesh fabric becomes secured to neighboring tissue after implantation, said pliable implantable sheet of mesh fabric having a body portion constructed and arranged to cover the defect opening and a peripheral portion circumscribing said body portion which is stiffer than said body portion.

Sub a1 → 48. An apparatus for loading and delivering a pliable implantable prosthesis into a trocar/cannula, the pliable implantable prosthesis having a first configuration larger than the lumen of the trocar cannula and being formable into a second

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configuration which is smaller than the lumen of the
trocar cannula, said apparatus comprising:

an elongated body having a lumen extending
therethrough and a longitudinal slot extending
radially from said lumen through the surface of said
elongated body, said elongated slot adapted to admit
the implantable prosthesis in the first configuration
and said lumen adapted to receive and maintain the
implantable prosthesis in the second configuration;

a distal end of said elongated body constructed
and arranged for mounting to the trocar cannula.

2
49. The loading and delivering apparatus
recited in claim 48 further including a cartridge
extending from said ^{elongated} body for holding the implantable
prosthesis in the first configuration.

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Sub C1
a ³
~~50.~~ The loading and delivering apparatus
recited in claim ²~~49~~ wherein said cartridge has an
opening in communication with said ^{elongated} slot, said
cartridge opening adapted to admit the implantable
prosthesis in the first configuration.

⁴
~~51.~~ The loading and delivering apparatus
recited in claim ²~~49~~ wherein said cartridge includes a
base to which the implantable prosthesis is seatable.

⁵
~~52.~~ The loading and delivering apparatus
recited in claim ⁴~~51~~ wherein said cartridge further
includes an upstanding sidewall extending from said
base.

Sub C2
⁶
~~53.~~ The loading and delivering apparatus
recited in claim ⁵~~52~~ wherein said cartridge further
includes a top extending from said upstanding
sidewall.

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7
54. The loading and delivering apparatus
recited in claim 53 wherein said top further includes
a door for providing selective access to ^{an} the interior
of said cartridge.

8
55. The loading and delivering apparatus
recited in claim 51 wherein said base further
includes a plurality of tabs for positioning the
implantable prosthesis relative to said ^{elongated} main body.

9
56. The loading and delivering apparatus
recited in claim 49 wherein said cartridge is
integrally molded to said ^{elongated} main body.

10
57. The loading and delivering apparatus
recited in claim 49 wherein said cartridge is
removably connected to said ^{elongated} main body.

11
58. The loading and delivering apparatus
recited in claim 49 wherein said cartridge extends
laterally from said ^{elongated} main body.

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¹²
~~59~~. The loading and delivering apparatus
recited in claim ¹~~48~~ further including means for
advancing the pliable implantable prosthesis in the
second configuration through said ^{elongated}~~main~~ body lumen.

¹³
~~60~~. The loading and delivering apparatus
recited in claim ¹~~48~~ further including an elongated
shaft axially and rotatably moveable in said body
lumen.

¹⁴
~~61~~. The loading and delivering apparatus
recited in claim ¹³~~60~~ wherein said elongated shaft
includes an opening adapted to threadably receive the
implantable prosthesis.

¹⁵
~~62~~. The loading and delivering apparatus
recited in claim ¹³~~60~~ wherein an implantable prosthesis
is releasably threaded to said elongated shaft.

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¹⁶
~~63~~. The loading and delivering apparatus
recited in claim ~~60~~¹³ further including means for
arresting axial movement of said elongated shaft
during a predetermined number of rotations of said
elongated shaft.

Sub C3
¹⁷
~~64~~. The loading and delivering apparatus
recited in claim ~~60~~¹³ wherein said elongated shaft
includes a portion which is externally threaded and
said main body portion includes a portion which is
internally threaded.

*N
P
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K*
65. A delivery apparatus for a trocar cannula,
comprising:

a main body having a lumen extending
therethrough and a distal end constructed and
arranged for mounting to the trocar cannula;

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an elongated introducer shaft axially moveable through said main body lumen; and

a pliable implantable prosthesis wound around said elongated introducer shaft, said wound pliable implantable prosthesis being moveable through said main body lumen.

66. The trocar cannula delivery apparatus recited in claim 65 wherein said elongated introducer shaft is rotatably moveable in said body lumen.

67. The trocar cannula delivery apparatus recited in claim 65 wherein said pliable implantable prosthesis has a first configuration larger than said body lumen and a second configuration smaller than said body lumen.

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68. A method of delivering an implantable prosthesis into the lumen of a trocar cannula, comprising:

winding an implantable prosthesis into a narrower configuration in the lumen of a delivery device;

mounting the delivery device to the trocar cannula;

advancing the narrowly configured implantable prosthesis from the delivery device into the trocar cannula lumen.

69. The method of delivering an implantable prosthesis recited in claim 68 wherein said winding step further comprises the step of feeding the

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implantable prosthesis into the delivery device in a direction perpendicular to the axis of the lumen.

70. The method of delivering an implantable prosthesis recited in claim 68 wherein the implantable prosthesis has a first expanded configuration and further comprising the step of storing the implantable prosthesis in the first expanded configuration prior to said winding step.

71. A method of repairing a defect in tissue or muscle, comprising:

providing an implantable prosthesis having a first portion sufficient to extend across and occlude the opening of the defect and a second portion circumscribing the first portion which is more rigid than the first portion, the implantable prosthesis

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having a sufficient hoop strength to prevent the first portion from deflecting into the defect opening;

positioning the implantable prosthesis so that the second portion circumscribes the defect opening.

72. A pre-loaded disposable delivery tool for laparoscopic delivery of a mesh prosthesis comprising:

a tubular delivery device having a proximal end, a distal end and a passageway therethrough;

a storage chamber having a mesh prosthesis contained therein in a substantially planar configuration;

means for drawing said prosthesis into said passageway and for compacting said planar prosthesis

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into a narrower configuration adapted to be passed
through said passageway;

means for advancing said compacted prosthesis
through said passageway and out of said distal end;

said prosthesis being constructed and arranged
to be sufficiently resilient so that, when
unconfined, it will expand and revert from its
compacted configuration toward its flat configuration.

add art